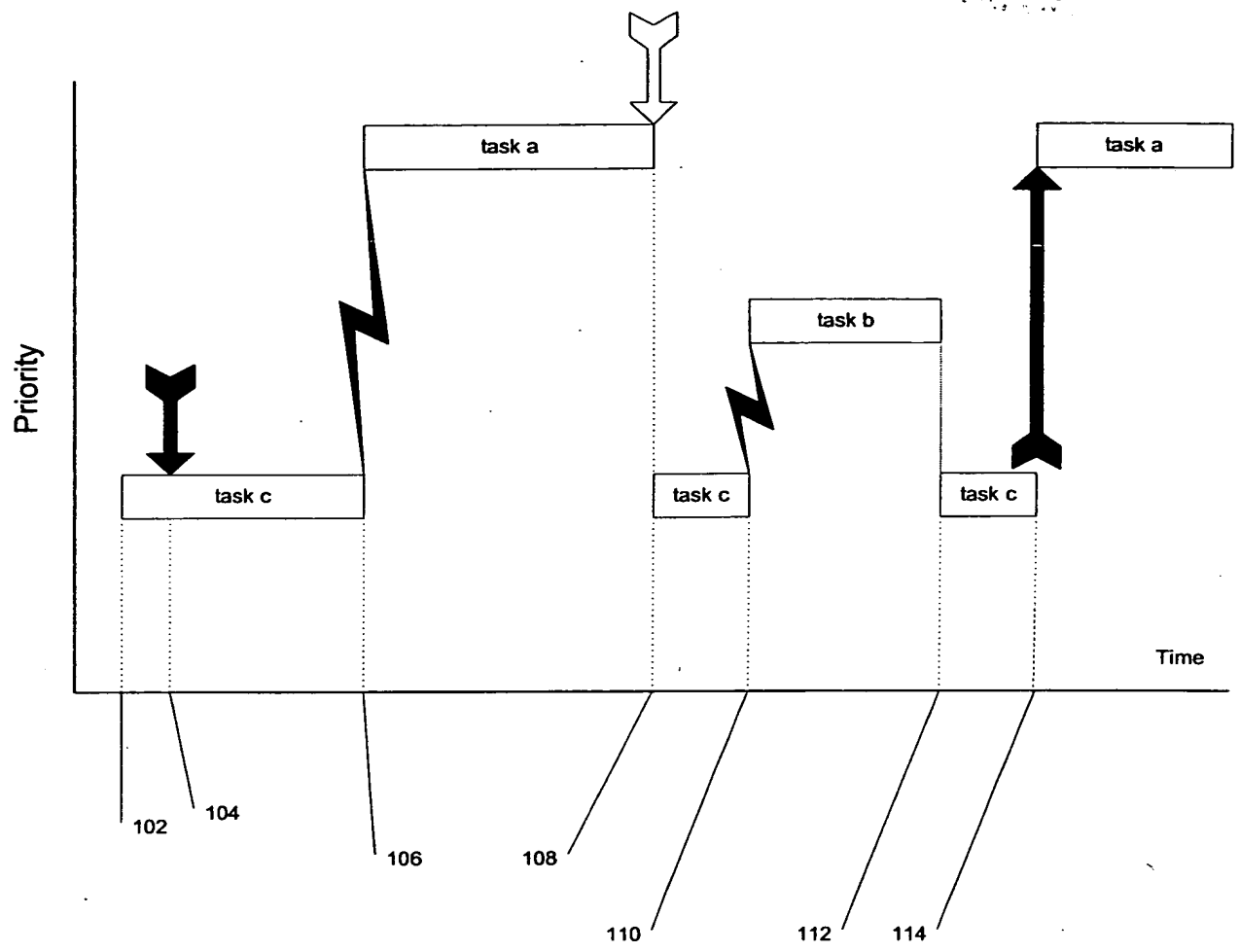
#3



Legend:

Task Receives Resource

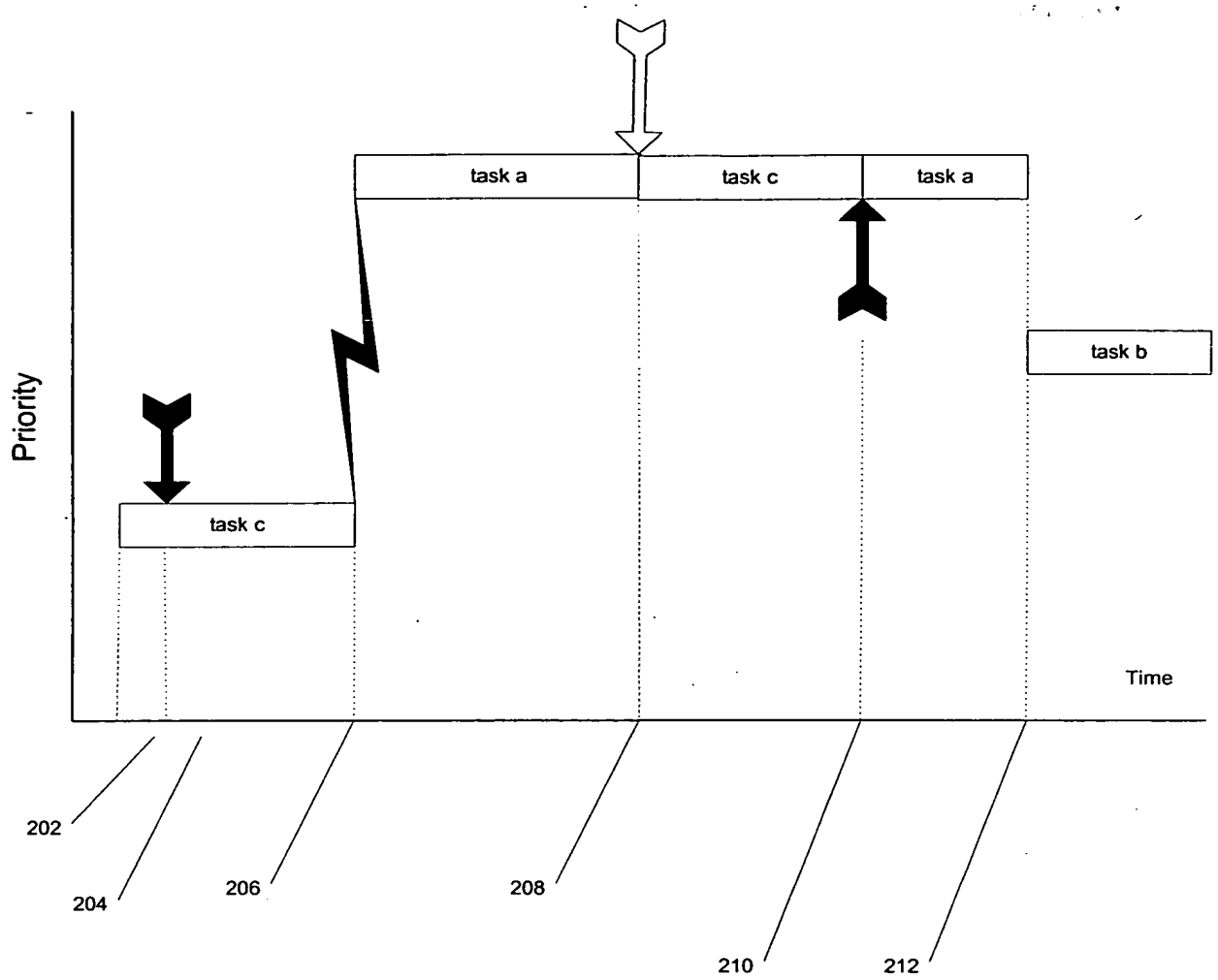
Task Requests Resource That Is Unavailable

Higher Priority Task Preempts Lower Priority Task

Figure 1

0968259.052001

Docket: 5852-0050



Legend:

Task Receives Resource

Task Requests Resource That Is Unavailable

Higher Priority Task Preempts Lower Priority Task

Figure 2

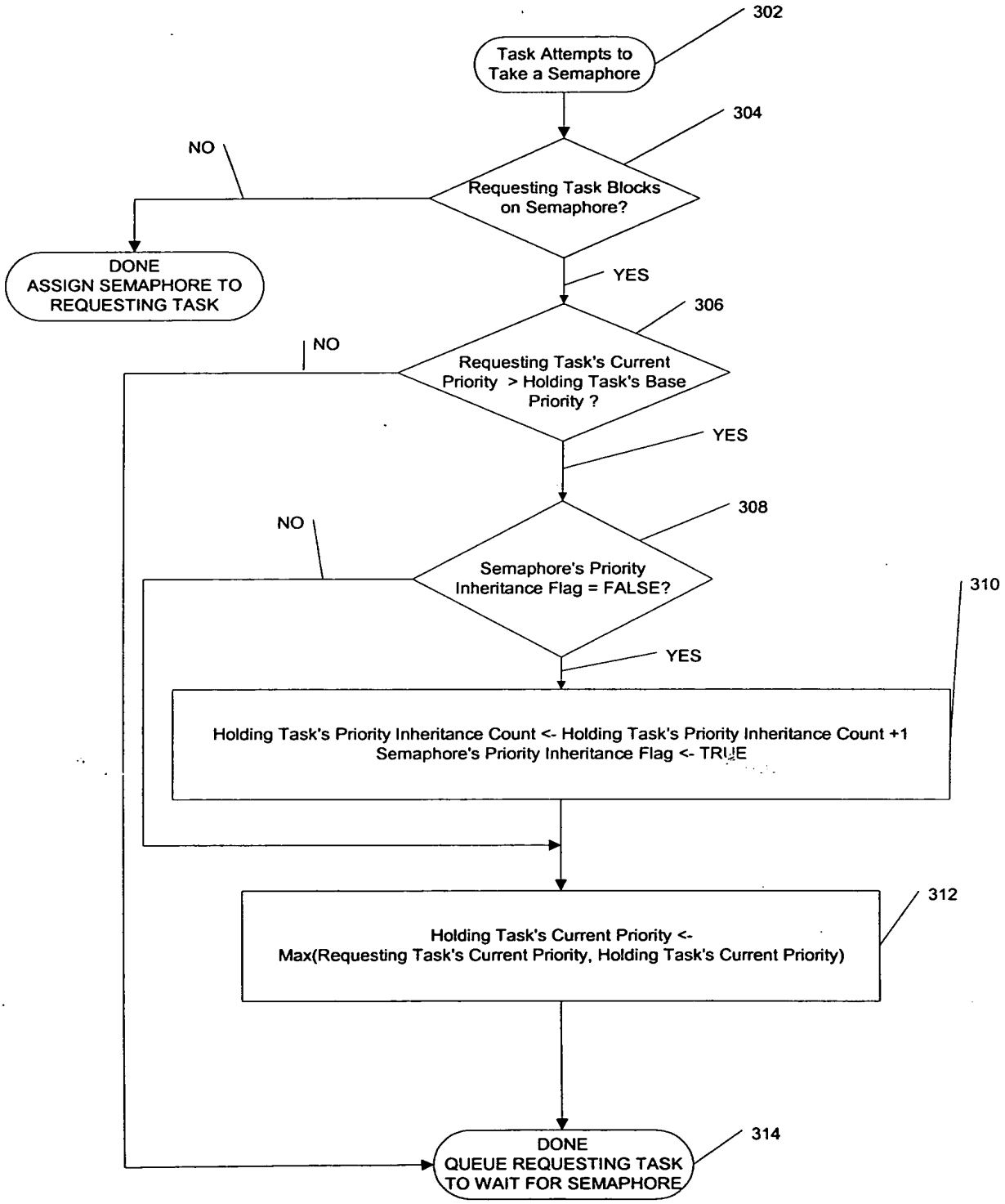

302
Task Attempts to Take a Semaphore
304
NO
Requesting Task Blocks on Semaphore?
DONE
ASSIGN SEMAPHORE TO REQUESTING TASK
YES
306
NO
Requesting Task's Current Priority > Holding Task's Base Priority ?
YES
308
NO
Semaphore's Priority Inheritance Flag = FALSE?
310
YES
Holding Task's Priority Inheritance Count <- Holding Task's Priority Inheritance Count +1
Semaphore's Priority Inheritance Flag <- TRUE
312
Holding Task's Current Priority <-
Max(Requesting Task's Current Priority, Holding Task's Current Priority)
314
DONE
QUEUE REQUESTING TASK TO WAIT FOR SEMAPHORE

Figure 3

08/15/2004

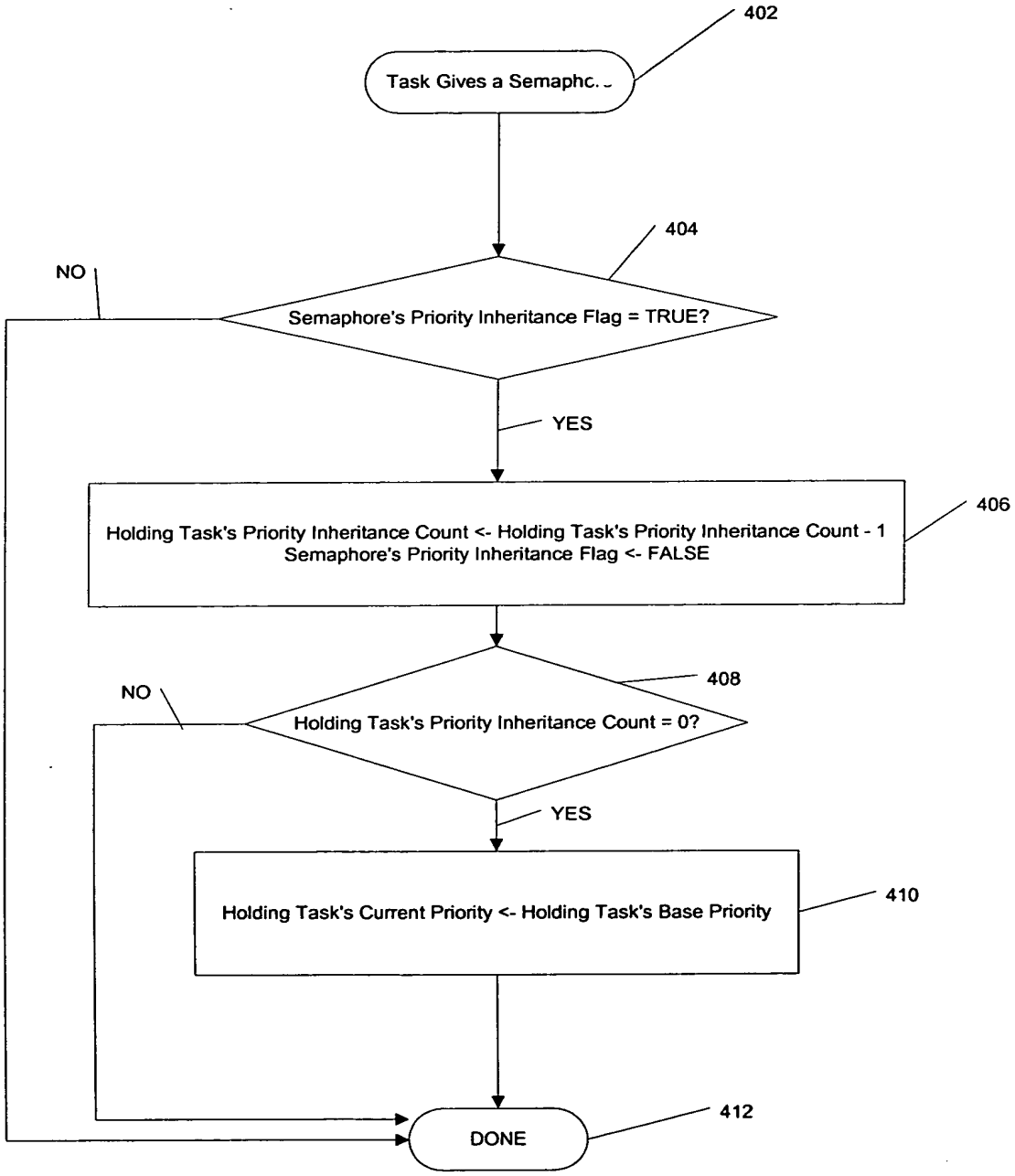


Figure 4

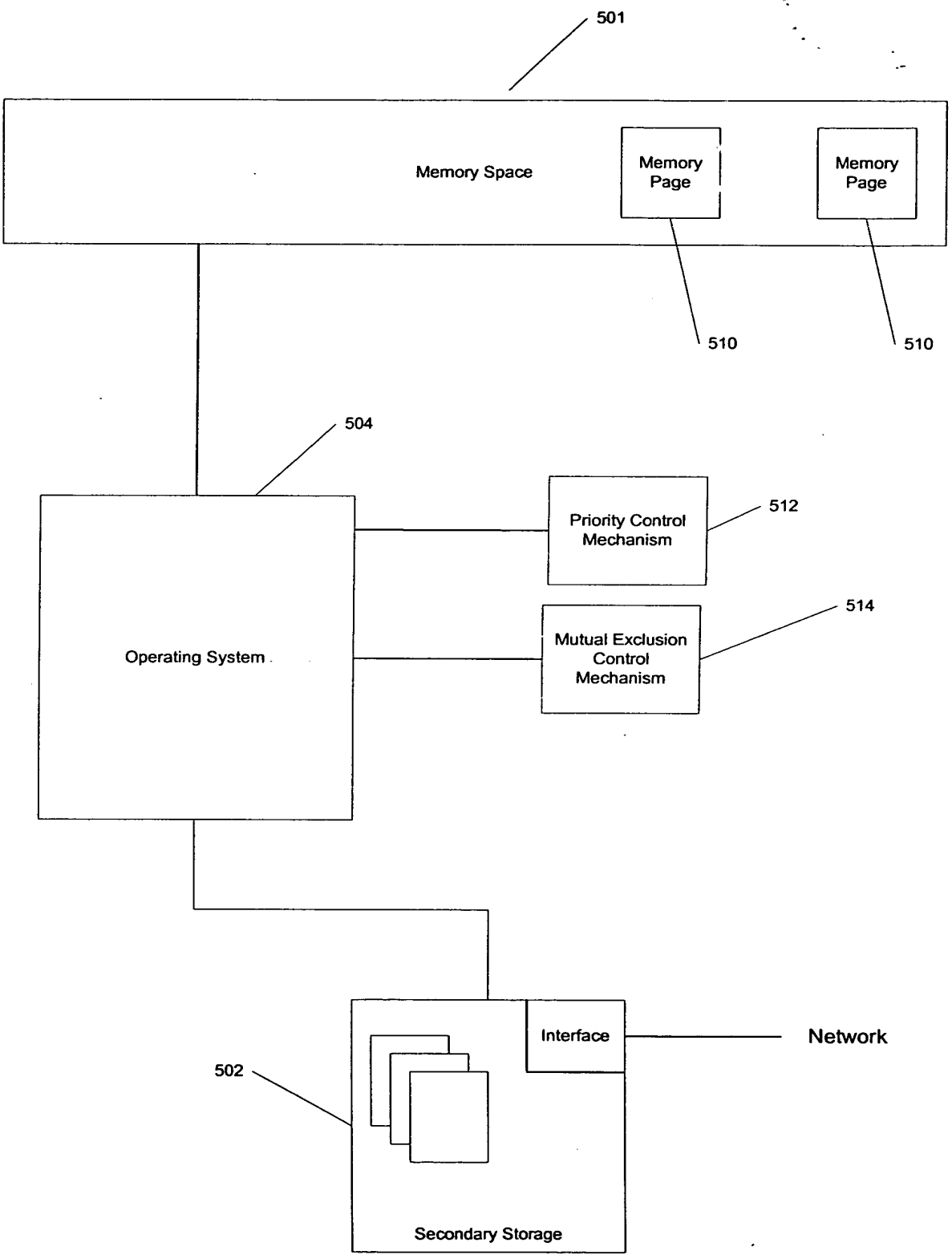

501
Memory Space
Memory Page
Memory Page
510
510
504
Operating System
Priority Control Mechanism
512
Mutual Exclusion Control Mechanism
514
Interface
Network
502
Secondary Storage

Figure 5

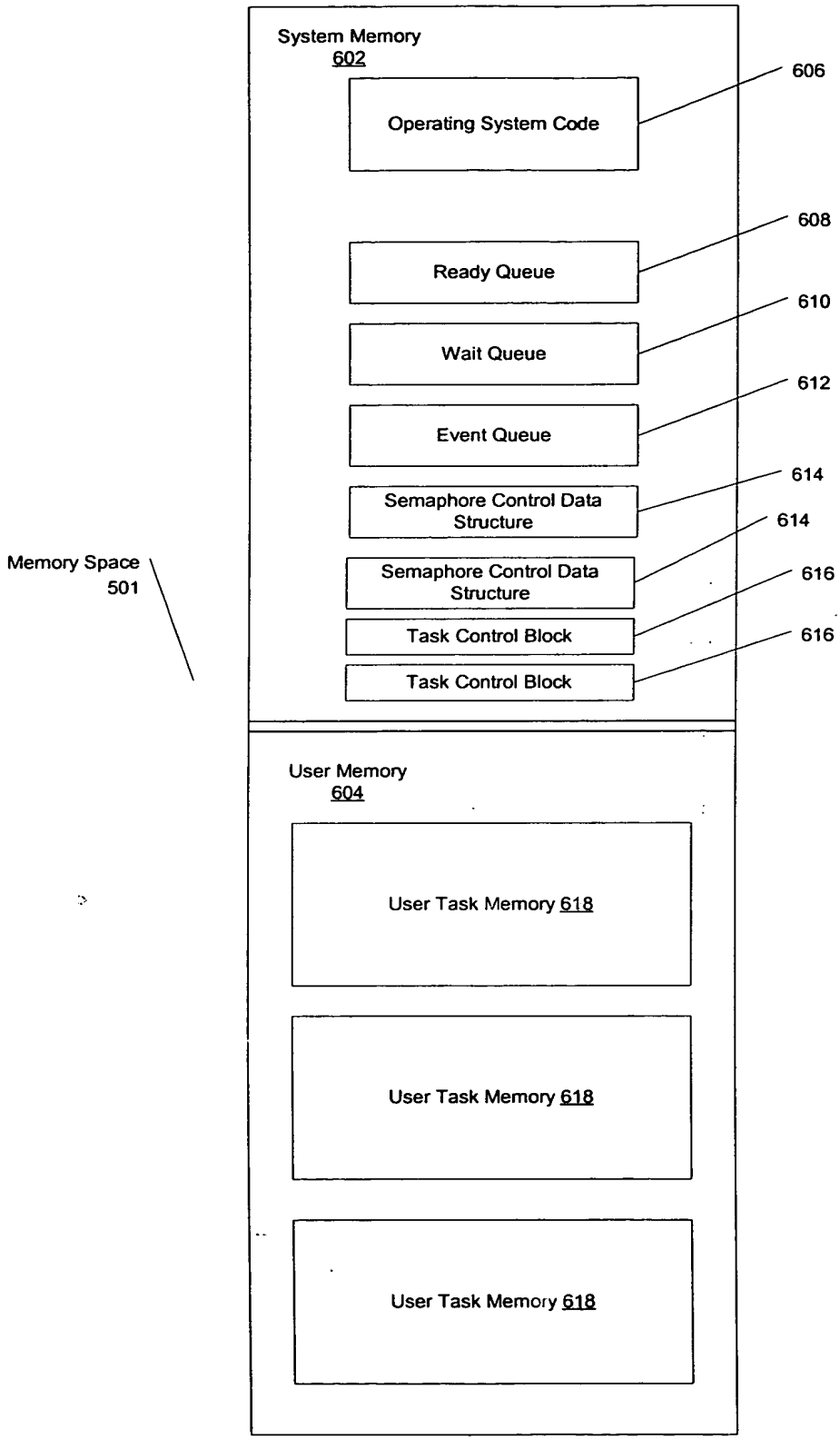

System Memory
602
Operating System Code
606
Ready Queue
608
Wait Queue
610
Event Queue
612
Semaphore Control Data Structure
614
Semaphore Control Data Structure
614
Task Control Block
616
Task Control Block
616
Memory Space
501
User Memory
604
User Task Memory 618
User Task Memory 618
User Task Memory 618

Figure 6

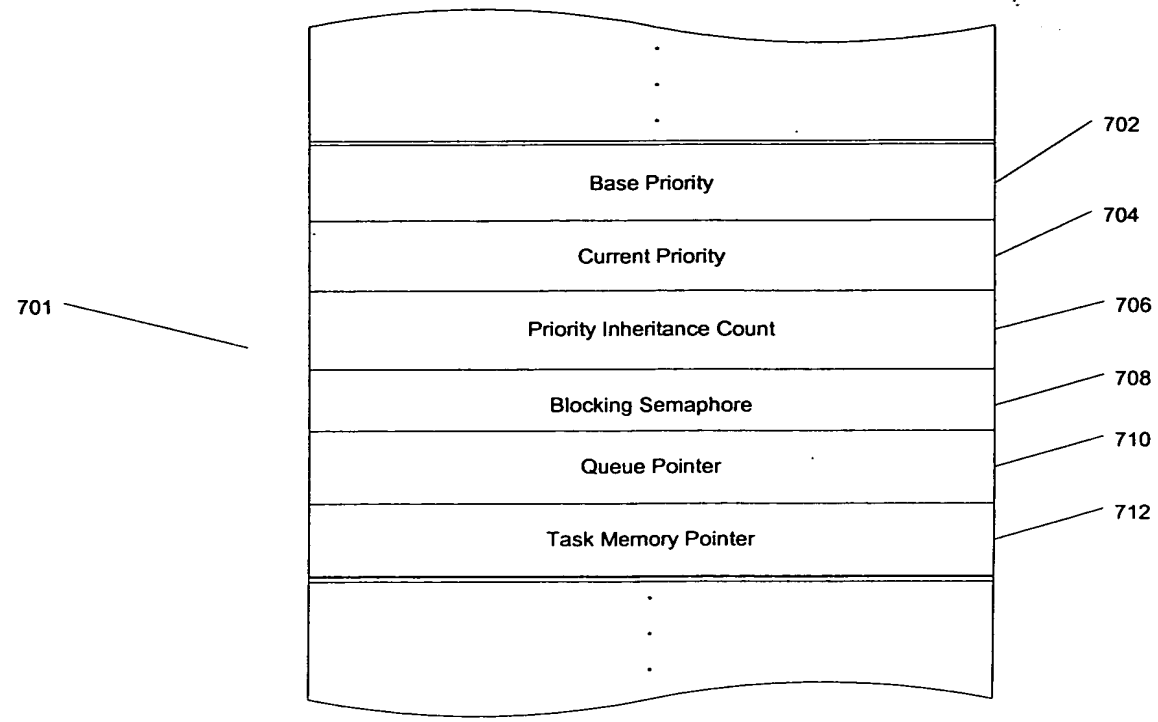

701
Base Priority
Current Priority
Priority Inheritance Count
Blocking Semaphore
Queue Pointer
Task Memory Pointer
702
704
706
708
710
712

Figure 7

08152505.060201

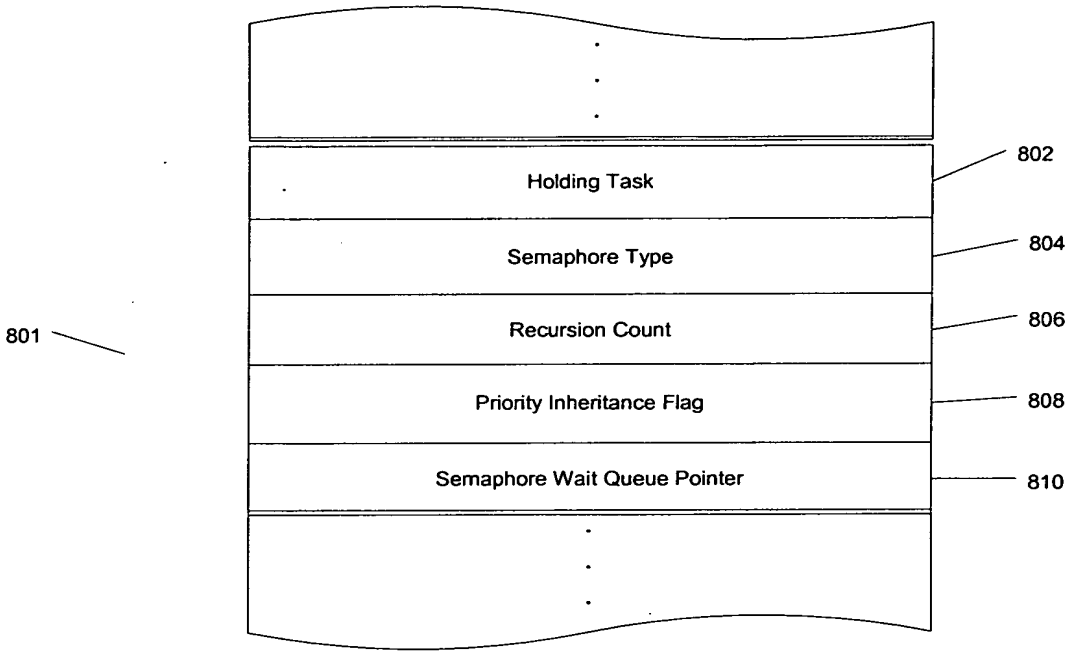


Figure 8

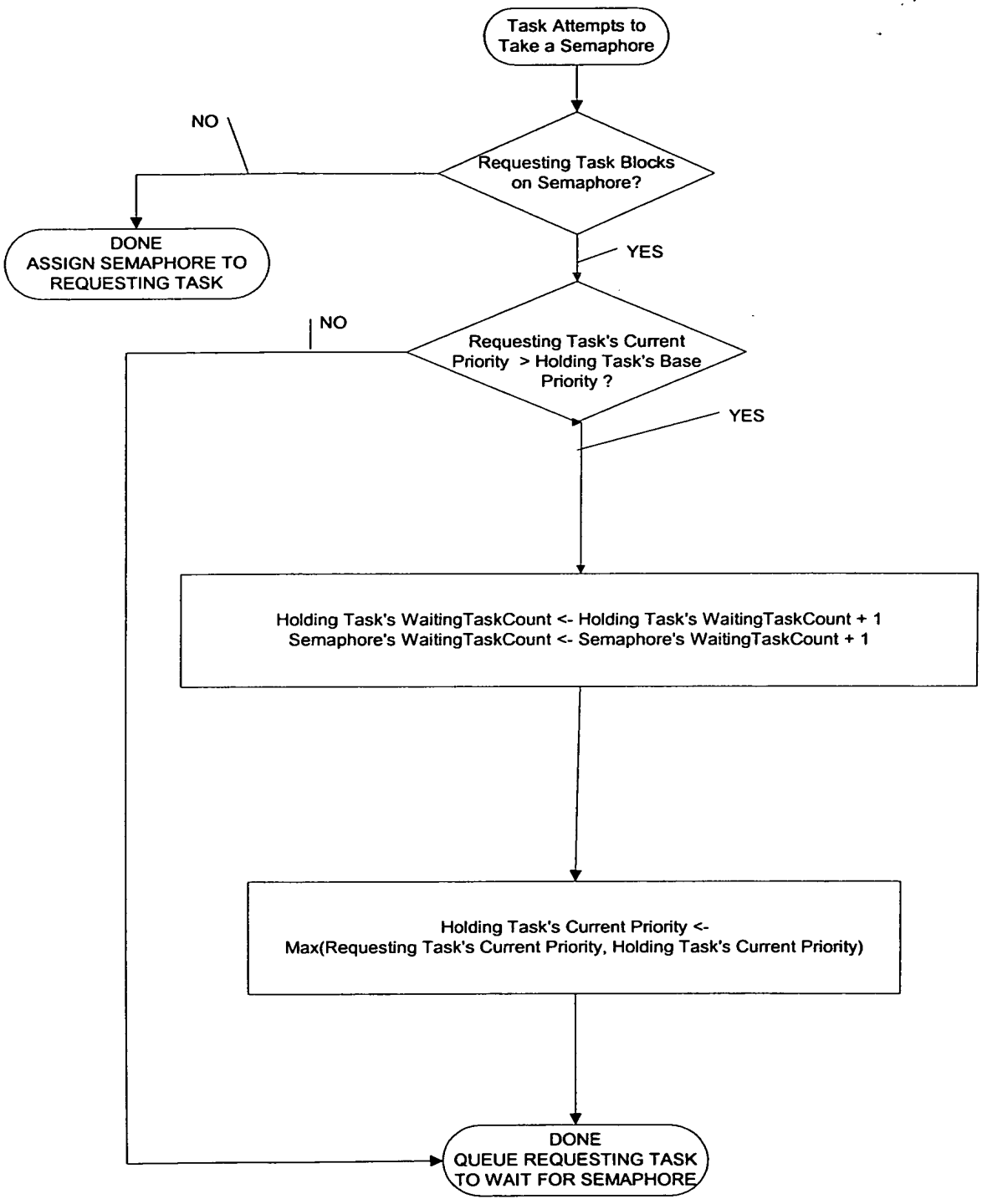

Task Attempts to Take a Semaphore
Requesting Task Blocks on Semaphore?
NO
DONE ASSIGN SEMAPHORE TO REQUESTING TASK
YES
Requesting Task's Current Priority > Holding Task's Base Priority ?
NO
YES
Holding Task's WaitingTaskCount <- Holding Task's WaitingTaskCount + 1
Semaphore's WaitingTaskCount <- Semaphore's WaitingTaskCount + 1
Holding Task's Current Priority <-
Max(Requesting Task's Current Priority, Holding Task's Current Priority)
DONE QUEUE REQUESTING TASK TO WAIT FOR SEMAPHORE

Figure 9

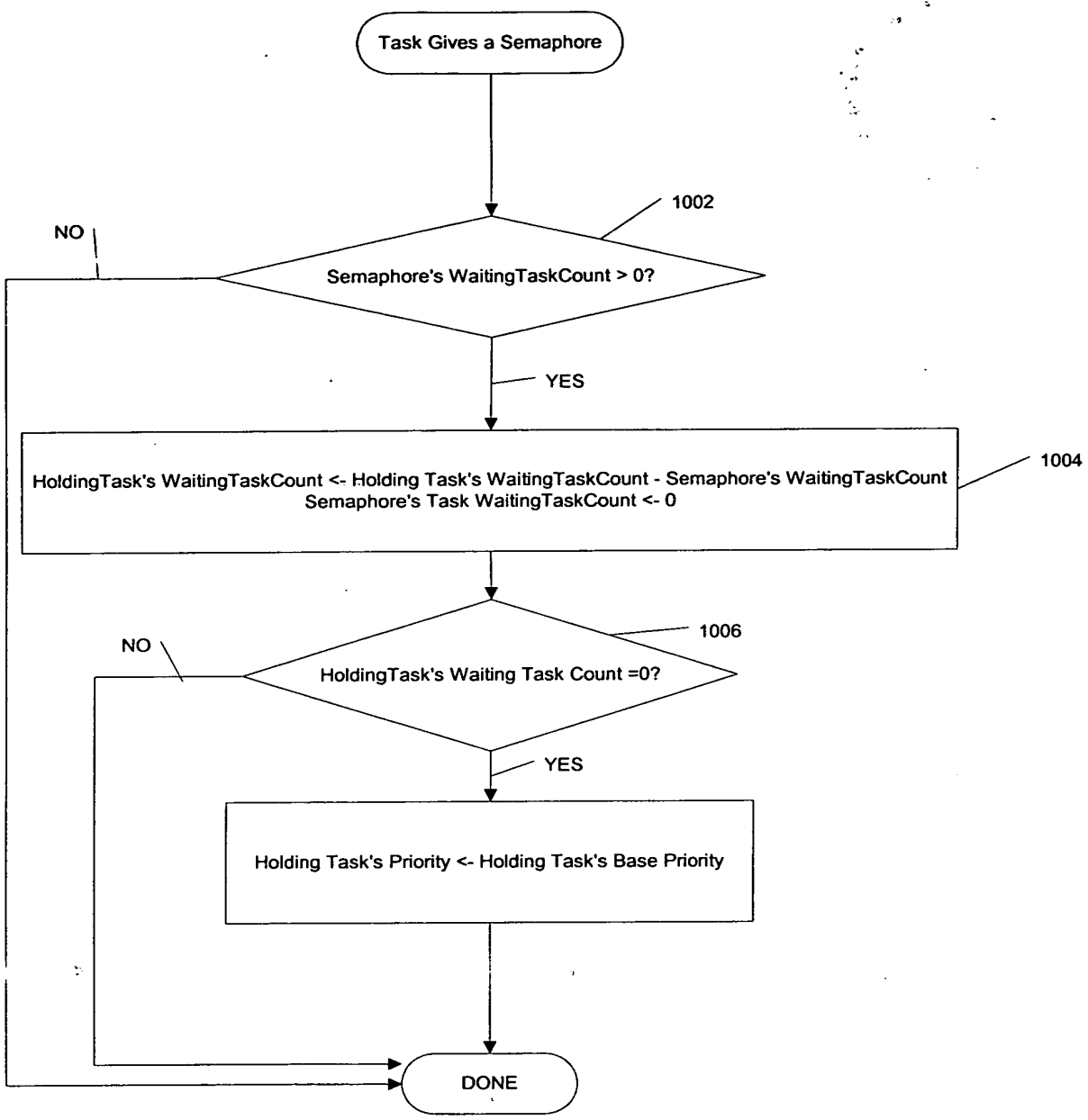

Task Gives a Semaphore
1002
NO
Semaphore's WaitingTaskCount > 0?
YES
HoldingTask's WaitingTaskCount <- Holding Task's WaitingTaskCount - Semaphore's WaitingTaskCount
Semaphore's Task WaitingTaskCount <- 0
1004
1006
NO
HoldingTask's Waiting Task Count =0?
YES
Holding Task's Priority <- Holding Task's Base Priority
DONE

Figure 10

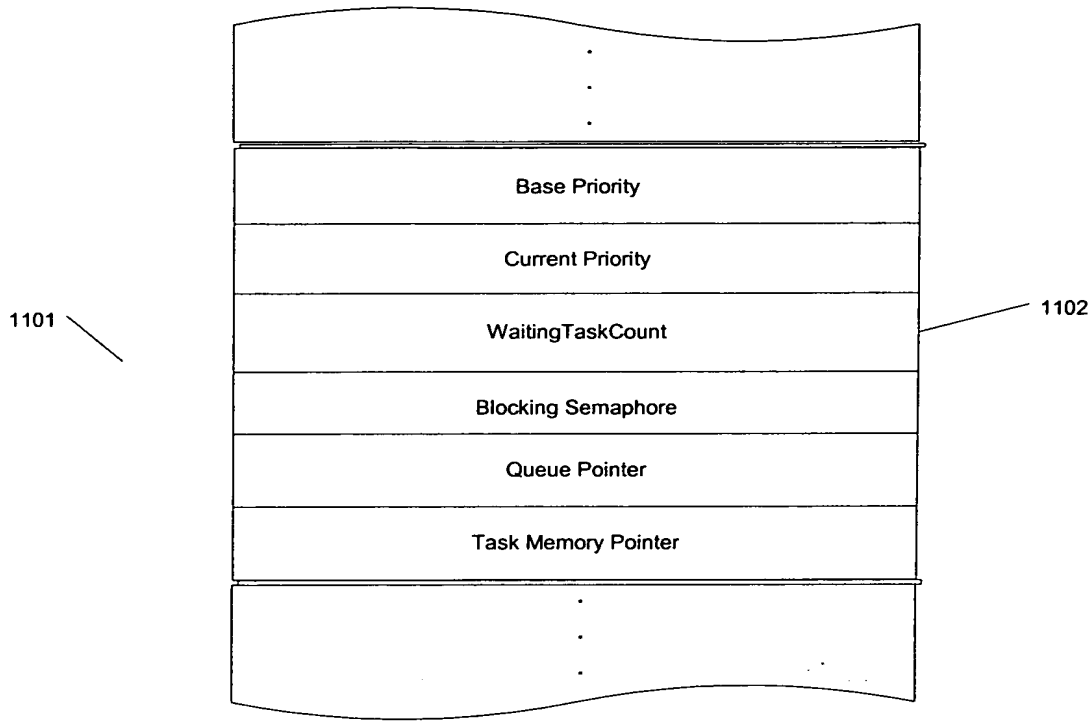

Base Priority
Current Priority
WaitingTaskCount
Blocking Semaphore
Queue Pointer
Task Memory Pointer
1101
1102

Figure 11

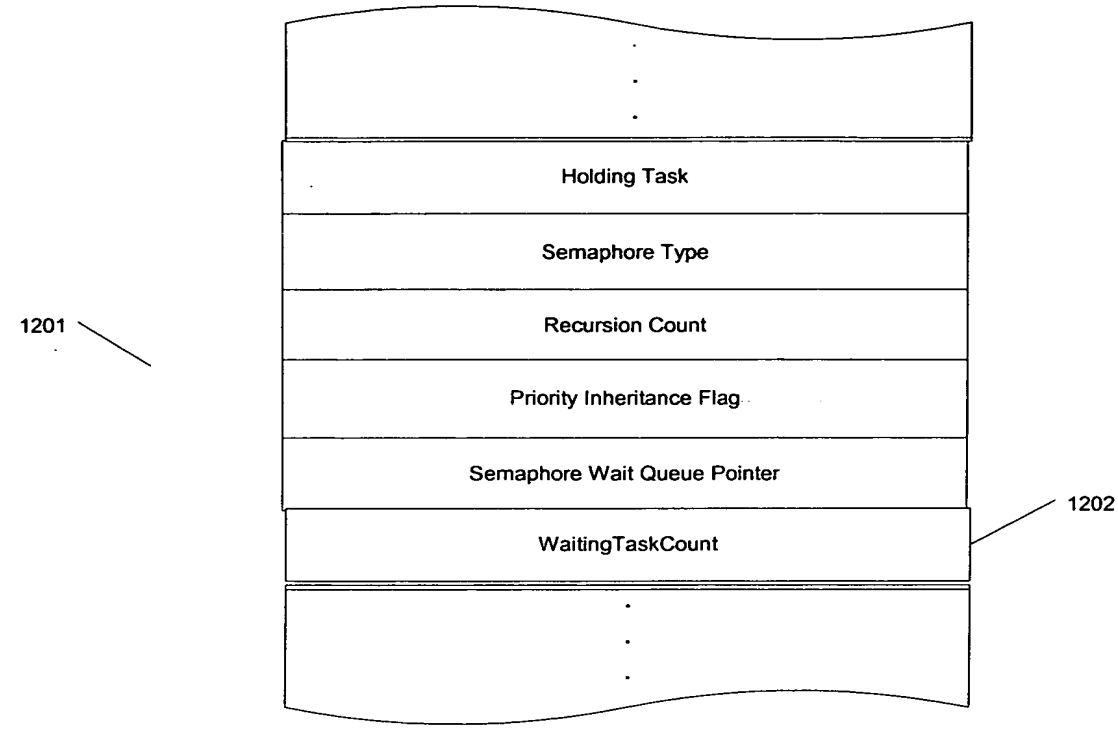

Holding Task
Semaphore Type
Recursion Count
Priority Inheritance Flag
Semaphore Wait Queue Pointer
WaitingTaskCount
1201
1202

Figure 12

Docket No. 50277-0550

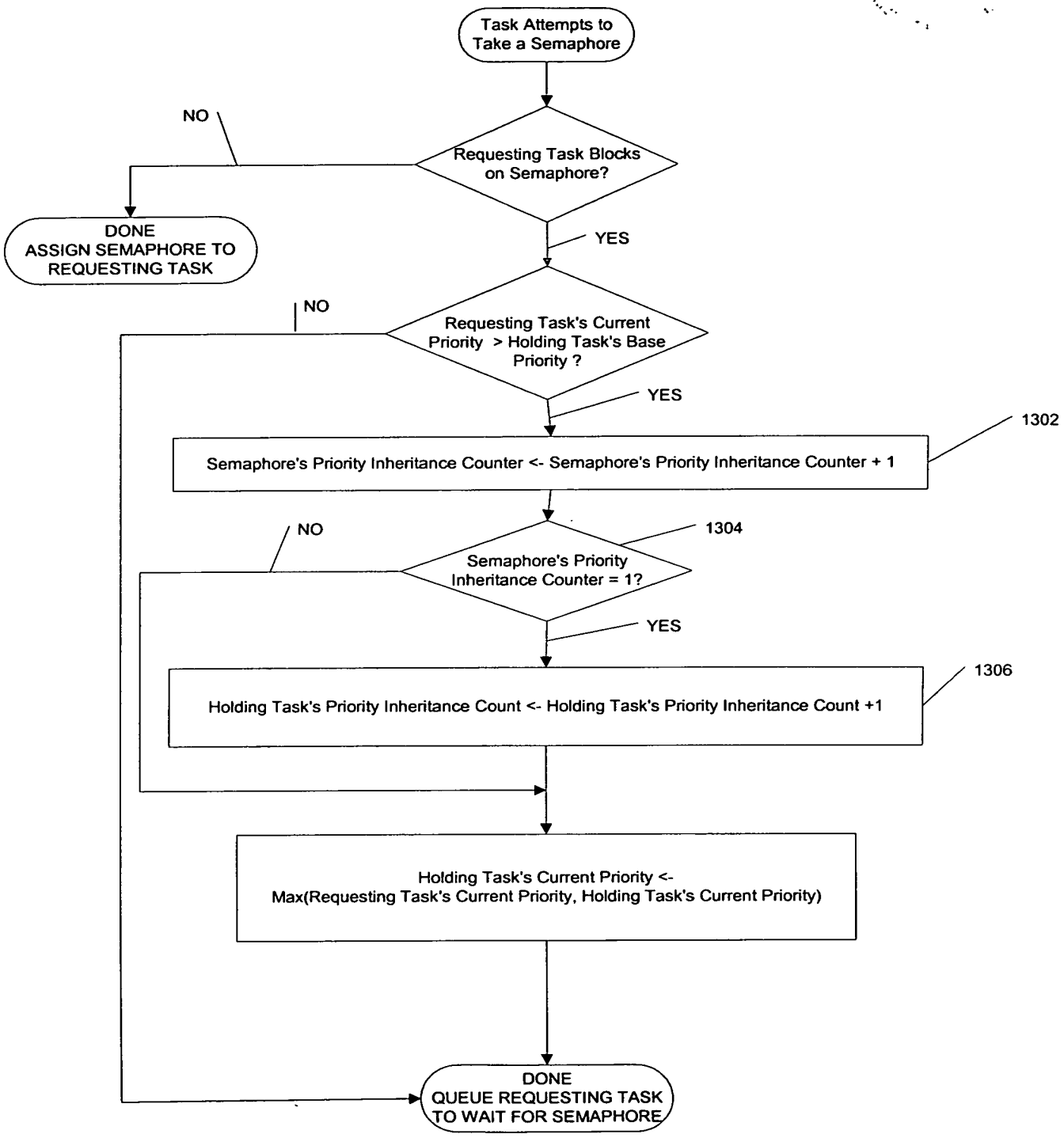


Figure 13

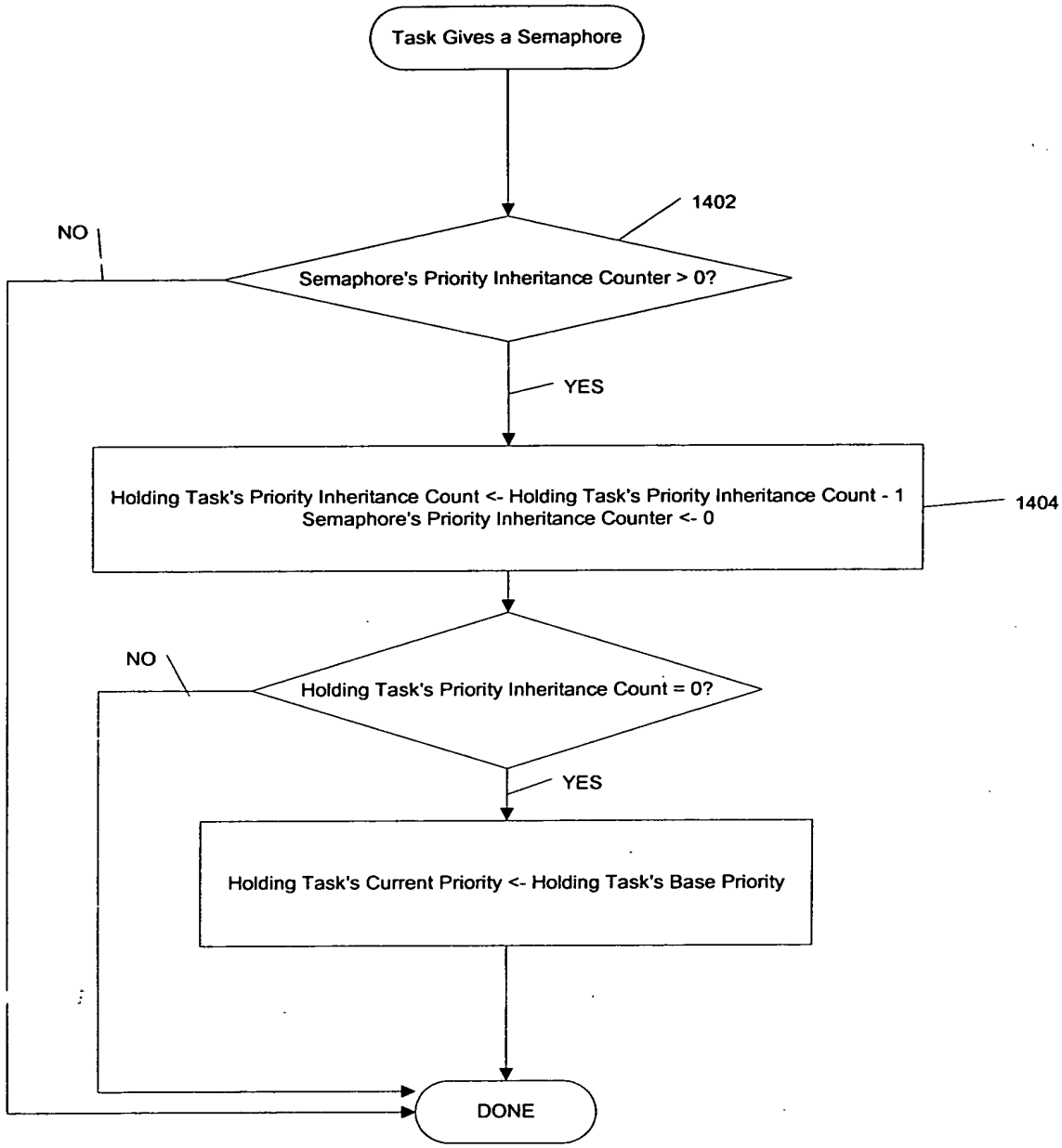

Task Gives a Semaphore
1402
NO
Semaphore's Priority Inheritance Counter > 0?
YES
Holding Task's Priority Inheritance Count <- Holding Task's Priority Inheritance Count - 1
Semaphore's Priority Inheritance Counter <- 0
1404
NO
Holding Task's Priority Inheritance Count = 0?
YES
Holding Task's Current Priority <- Holding Task's Base Priority
DONE

Figure 14

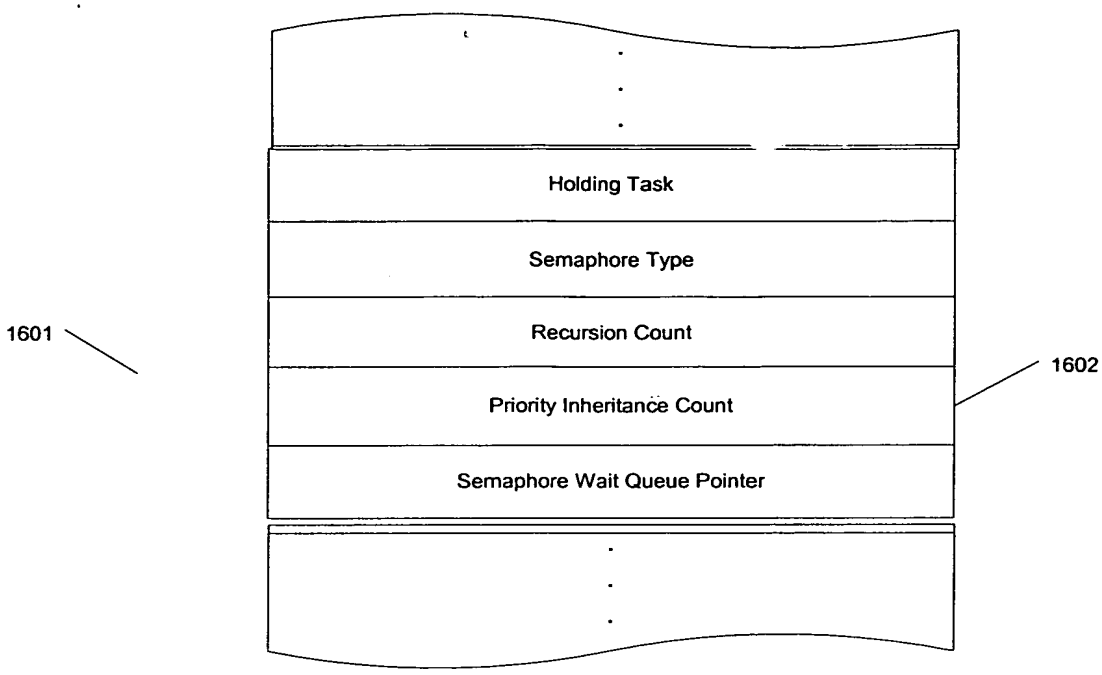
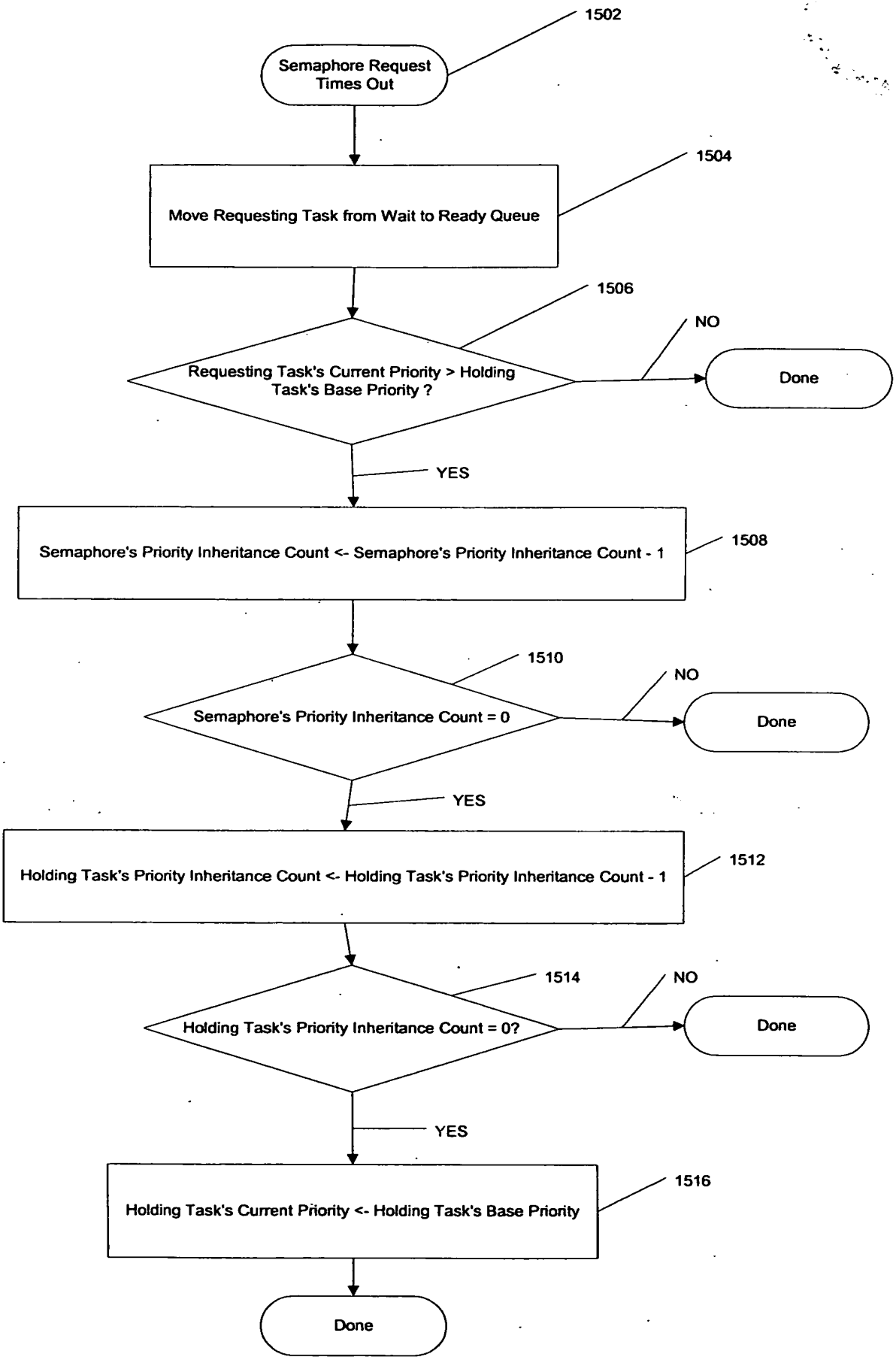

Holding Task
Semaphore Type
Recursion Count
Priority Inheritance Count
Semaphore Wait Queue Pointer
1601
1602

Figure 16


1502
Semaphore Request Times Out
1504
Move Requesting Task from Wait to Ready Queue
1506
Requesting Task's Current Priority > Holding Task's Base Priority ?
NO
Done
YES
Semaphore's Priority Inheritance Count <- Semaphore's Priority Inheritance Count - 1
1508
1510
Semaphore's Priority Inheritance Count = 0
NO
Done
YES
Holding Task's Priority Inheritance Count <- Holding Task's Priority Inheritance Count - 1
1512
1514
Holding Task's Priority Inheritance Count = 0?
NO
Done
YES
Holding Task's Current Priority <- Holding Task's Base Priority
1516
Done